

Feed Conversion Ratio Of Major Carp *Cirrhinus mrigala* Fingerlings On Feeding Schedule Of Probiotic Spirulina Incorporated Experimental Diets.

ABSTRACT

The 60 days experiment was conducted with a view to observing the effects of probiotic bacterial diets on the growth of *Cirrhinus mrigala* fingerlings. After feeding experiments, the growth parameters such as wet weight gain, specific growth rate, food conversion ratio, food consumption rate, were individually determined. Three fishes from each treatment were sampled at 15 days intervals and accordingly the total feed per tank administered was altered. At the ends of the experiment, Food conversion ratio (FCR) was observed that fishes fed with the diet containing spirulina showed (5.36 to 7.41) values. Hence, feed impregnated with spirulina was found to be the best. Results showed that, treatments with spirulina diet had FCR significantly lower than those for control basal feed.

Key words : Major Carps, FCR, Spirulina.

INTRODUCTION

The feed conversion ratio (FCR) is a good tool to measure the acceptability and suitability of artificial feed for fish. The role of artificial feed in intensive fish farming cannot be ignored as nutritional requirements of fish depend upon the feed supplied. The quantity and quality of feed consumed have pronounced effect on growth rate, efficiency of feed conversion and survival. The FCR values of various fish feed ingredients for carps under controlled conditions have been estimated by many workers. (Chang et al. 1983, Jhingran, 1991). The proper information of FCR on locally available ingredients can provide the basis to develop acceptable feed, through the task of preparing acceptable and suitable artificial feed for major carps are complicated one due to their feeding preferences. The probiotics in aquaculture improve the digestibility of nutrients and enhance feed utilization.

Spirulina can partially replace fishmeal proteins in fish feeds; it enhanced growth in the fish. Probiotics are live microbial cells that are administered to the gastrointestinal tract of the host as a feed supplement. The addition of probiotics in feed reduced the culture cost of Indian major carps. Better growth rates are obtained, and less feed is wasted because of the inherent palatability of spirulina. Fish fed with spirulina have less abdominal fat, the energy being redirected into growth. Spirulina feeds are rich in nutrients, with the high protein content, vitamins, essential amino acids and fatty acids. Spirulina feed enhanced immune activity, growth and rate for the aquaculture of juvenile fishes (Kim et al., 2013). In addition to high quality proteins, it contains high amounts of

calcium, vitamins B12 and enzymes. Spirulina feed is also very rich in terms of iron content (Radulovieet al., 2016).Spirulina feed has been used as a nutrient for fish larvae and ingredient in fish diet for juveniles and adult common carps (Palmegianoet al., 2008).Several studies have been conducted using dried spirulina as a feed supplement for fishes (Mukherjee etal., 2011; Roy et al., 2011)

MATERIALS AND METHODS

The experiment was conducted to study the FCR of *C.mrigala* fingerlings feed on probiotic feeds. The experimental diets were prepared with selective feed ingredientsviz; corn flour, wheat flour, rice bran, groundnut oil cake, tapioca powder, Agar agar, dried silk moth power, cod liver oil, vitamins and minerals as per 'pearson square method' using predetermined values of 40% protein(table-1). Spirulina feed were prepared with pure culture isolates of *Spirulinafusiformis* feeds were formed at various proportions (1, 2, 3, 4 &5%) respectively. The feed without probiotic (spirulina) is used as control feed. Separate control groups were maintained for each type of probiotic feeds. The feed with spirulina inclusion feeds are named as PS1, PS2, PS3, PS4, PS5 .

Experiment was conducted over two months(60 days) period at laboratory. Selected fingerlings having same size, their average live body weight was 3.00 ± 1.00 g and the average total length was 4.00 ± 1.00 cm.Their sex was not taken into consideration. Feeding experiments were conducted with control diet and different probiotic experimental feeds. Experimental fishes were placed in a trough with a size of 34 x 12cms, which is filled with 15Lts of water. The troughs were placed side by side in two lines. Each feed treatment was applied in triplicates. Feeding rate for all the diet types were 8% of body biomass. The fish were fed once in the morning. Satiations were determined based on visual observation of acceptance and refusal of feed. The fish wastes (unconsumed feed and excrement) from the bottom of the troughs were siphoned with a rubber pipe daily. The dissolved oxygen level of water was maintained at 5.10 ± 1 mg/lt. To supply oxygen to the troughs, air pumps were used. Carbon dioxide level was 6ppm and temperature was 27° to 28°C.

At the end of the experiment (60 days), fish fingerlings from all treatments were weighed, based on which the growth parameter weight gain (%) was caculated, All weighting made in an electrical digital balance too an accuracy of 1mg. Feed Conversion Ratio (FCR), Specific growth rate (SGR) and survival (%) were calculated (Table 2). The feed conversion Ratio was worked out according to the following formula(Jhingran 1991).

$$\text{Food conversion Ratio (FCR)} = \frac{\text{Food consumed (g)}}{\text{Wet body weight gain (g)}}$$

Data obtained were subjected to the analysis of variance (ANOVA) and correlation analysis. SPSS (V 20.0) was applied to determine whether significant variations between control and experiment values. Difference between means were determined and compared by Duccan multiple range test (DMRT) and the significances are mentioned. The data are represented as mean + standard deviation.

Table: 1. Biochemical constituents of probiotic spirulina incorporated experimental diets.

S.No	Probiotic feed types	Crude Protein(%)	Crude carbohydrates	Crude Lipids(%)
1	CONTROL	39.78	37.18	3.18
2	PS1	42.17	38.16	3.84
3	PS2	42.18	38.54	3.90
4	PS3	43.00	39.00	4.26
5	PS4	44.86	39.80	4.54
6	PS5	45.47	40.63	4.86

Table: 2. Growth performance and food conversion ratio of *Cirrhinus mrigala* fingerlings fed with different percentage of probiotic spirulina feeds.

S.No	Parameters	Feed types					
		Control	PS1	PS2	PS3	PS4	PS5
1	Initial weight(g)	3.03	3.11	3.17	3.48	3.26	3.24
		±	±	±	±	±	±
		0.05	0.03	0.07	0.18	0.03	0.17
2	Final weight(g)	4.90	5.32	5.86	6.27	6.83	6.92
		±	±	±	±	±	±
		0.08	0.06	0.05	0.06	0.06	0.07
3	Net weight gain(g)	1.86	2.20	2.69	2.66	3.52	3.69
		±	±	±	±	±	±
		0.10	0.07	0.40	0.07	0.05	0.12
4	Percent gain in weight (%)	61.05	70.75	84.94	73.05	109.73	110.44
		±	±	±	±	±	±
		3.97	2.50	3.00	3.15	1.90	12.09
5	Food conversion ratio (FCR)	7.41	7.12	6.34	7.03	5.37	5.36
		±	±	±	±	±	±
		0.63	0.58	0.12	0.21	0.16	0.18

Aquaculture development has been considered a very rich source of high biological value protein diet to ever-growing human population. Consequently the sector has developed strategies in various countries to improve fish production. Among these strategies, the more promising is the use of probiotic incorporated feed. In this investigation, the *Spirulina fusiformis* feeds were analyzed for their potential growth effects on fish fingerlings. During the period of 60 days experiment, the effects of *Spirulina fusiformis* formulated diet and control diets on the growth of *Cirrhinus mrigala* fingerlings was ascertained.

In the current study, the amount of dry substance gained or lost by the fish after 60 days of feeding at different treatments was calculated and expressed gram dry substance gained/lost/fish/day. The feed given were adjusted at 15 days intervals after the fish were weighted. The results showed that different treatments (PS0, PS1, PS2, PS3, PS4, PS5%) had significant effect on the feeding parameters. The rate of consumption of fish fingerlings were different, fish fed with spirulina (5%) had higher feed consumption. (19.71g) than other experimental feeds. The lower consumption (13.70g) was noticed in control basal diet (table-23). In this study the

experimental feed fed group showed an elevated level of consumption. The result indicated that the supplementary feed with spirulina ingredient is well utilized by the *Cirrhinus mrigala*. Spirulina supplementation in fish plays a role in enhancing feed intake, these results agreed with Soivio et al., (1989) who concluded that the differences in protein content of fish body composition may be related to spirulina protein ratio.

At the ends of the experiment, Food conversion ratio (FCR) was observed that fishes fed with the diet containing spirulina showed (5.36 to 7.41) values (figure 35). Hence, feed impregnated with spirulina was found to be the best (table-26). The current studies are inconsistent with that Lu et al., (2002) improved feed conversion ratio in striped jack fed with spirulina diet. Results showed that, treatments with spirulina diet had FCR significantly lower than those for control basal feed. Similar results have been reported for feed additives used in diets for piglets (Gil, 1998). In the present study, the FCR was significantly higher in mrigal fed with 5% spirulina. This is an agreement with the work of Nandeeshat et al., (2001); Ghosh et al., (2003); Ramakrishnan et al., (2008) and Tongsiriet al., (2010).

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